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(54) **APPARATUS FOR CONTROLLING ROOM LIGHTING IN RESPONSE TO BED EXIT**

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See application file for complete search history.

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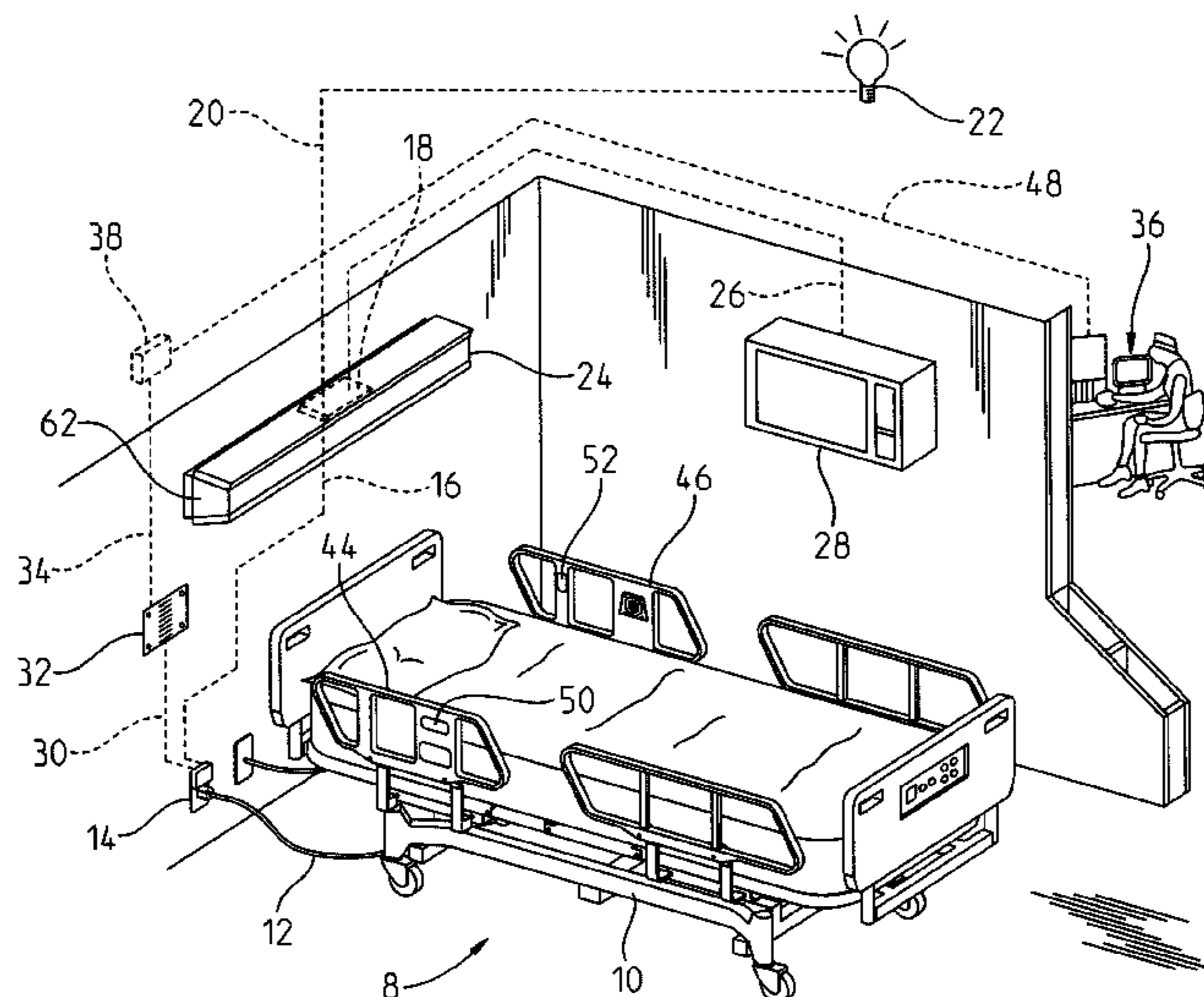
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(57) **ABSTRACT**

A patient position-activated room device control apparatus coupled to a patient’s bed controls a device associated with a patient’s room in response to the patient changing position relative to the patient’s bed.

23 Claims, 7 Drawing Sheets



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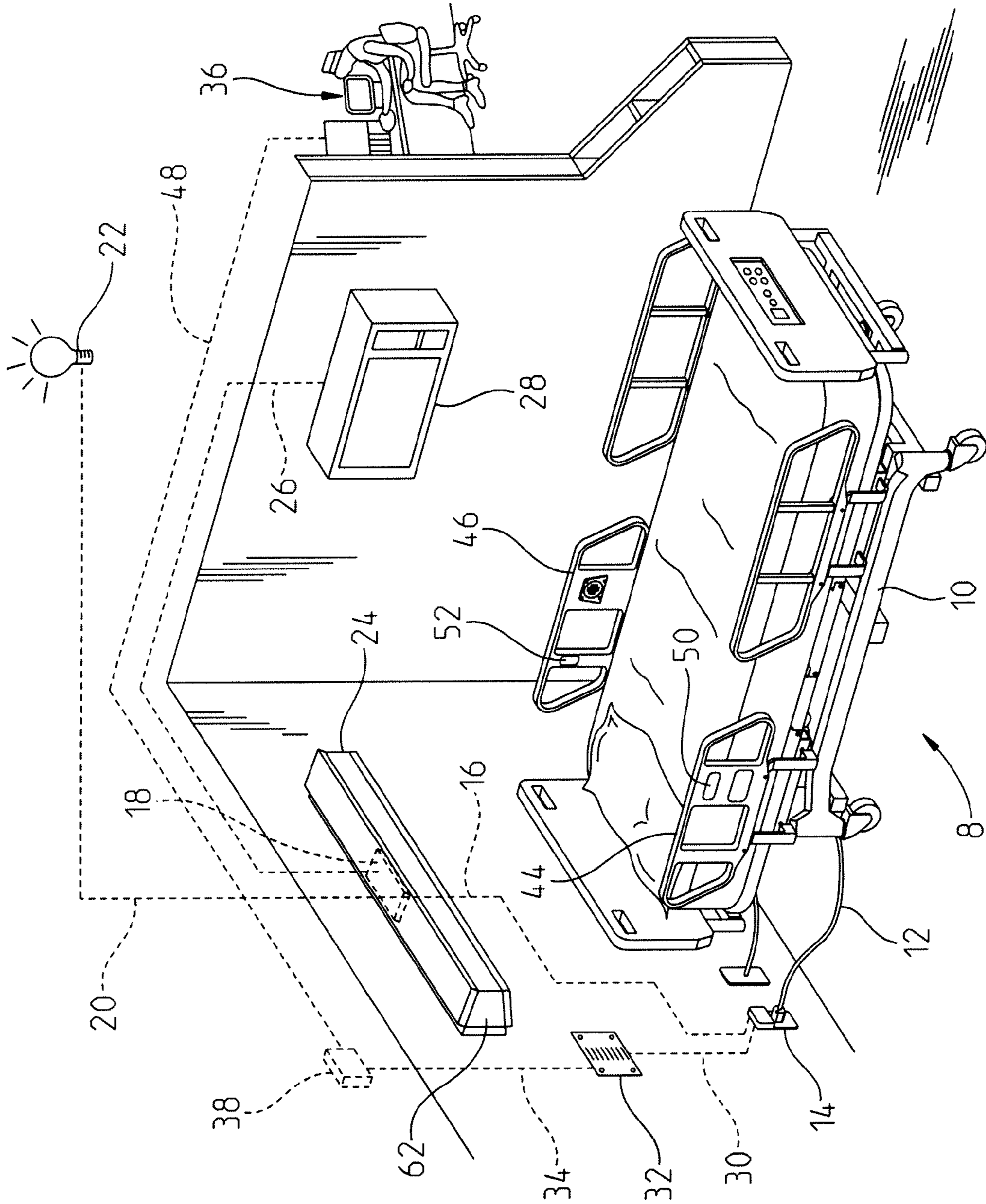


FIG. 1

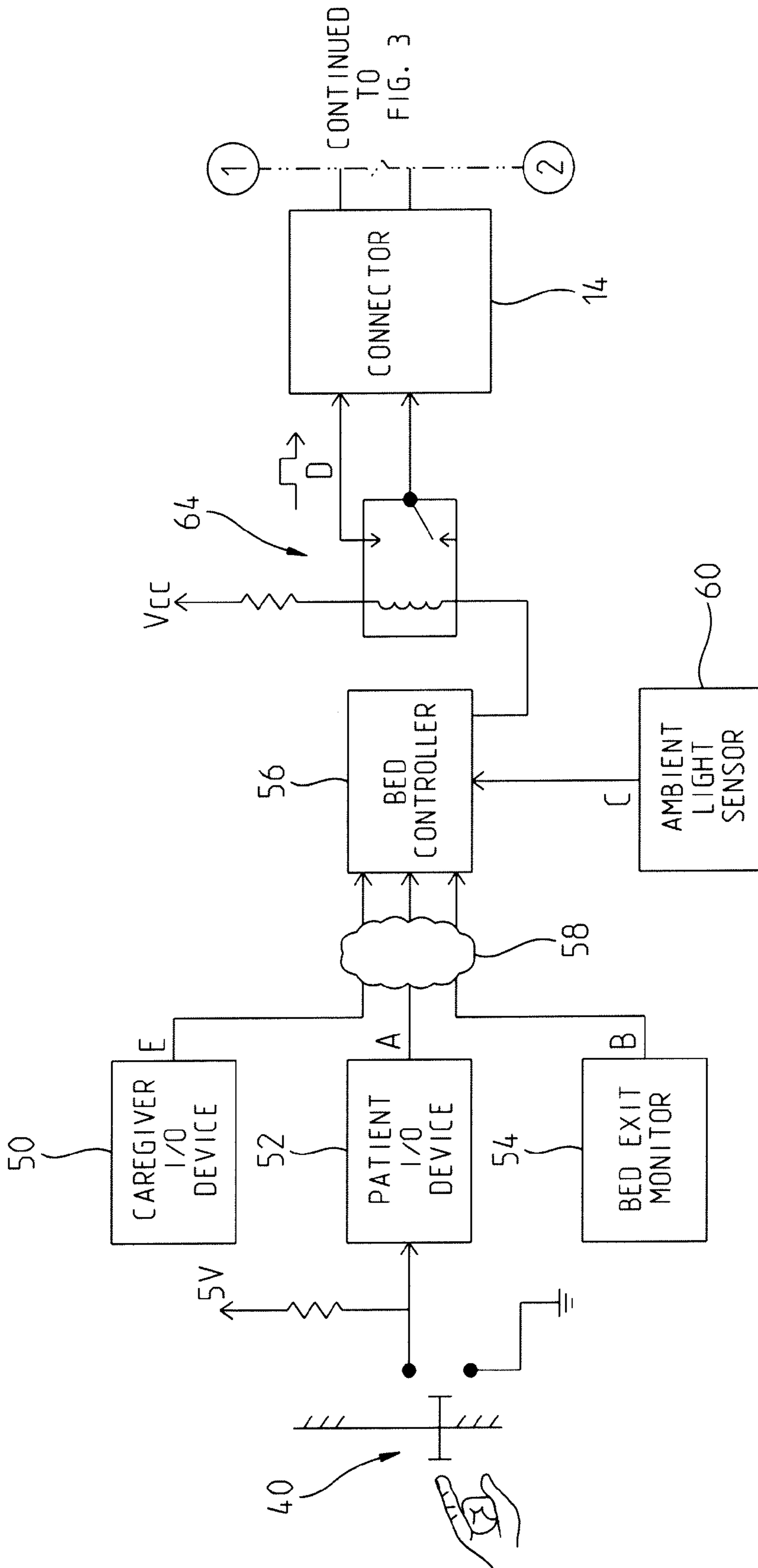


FIG. 2

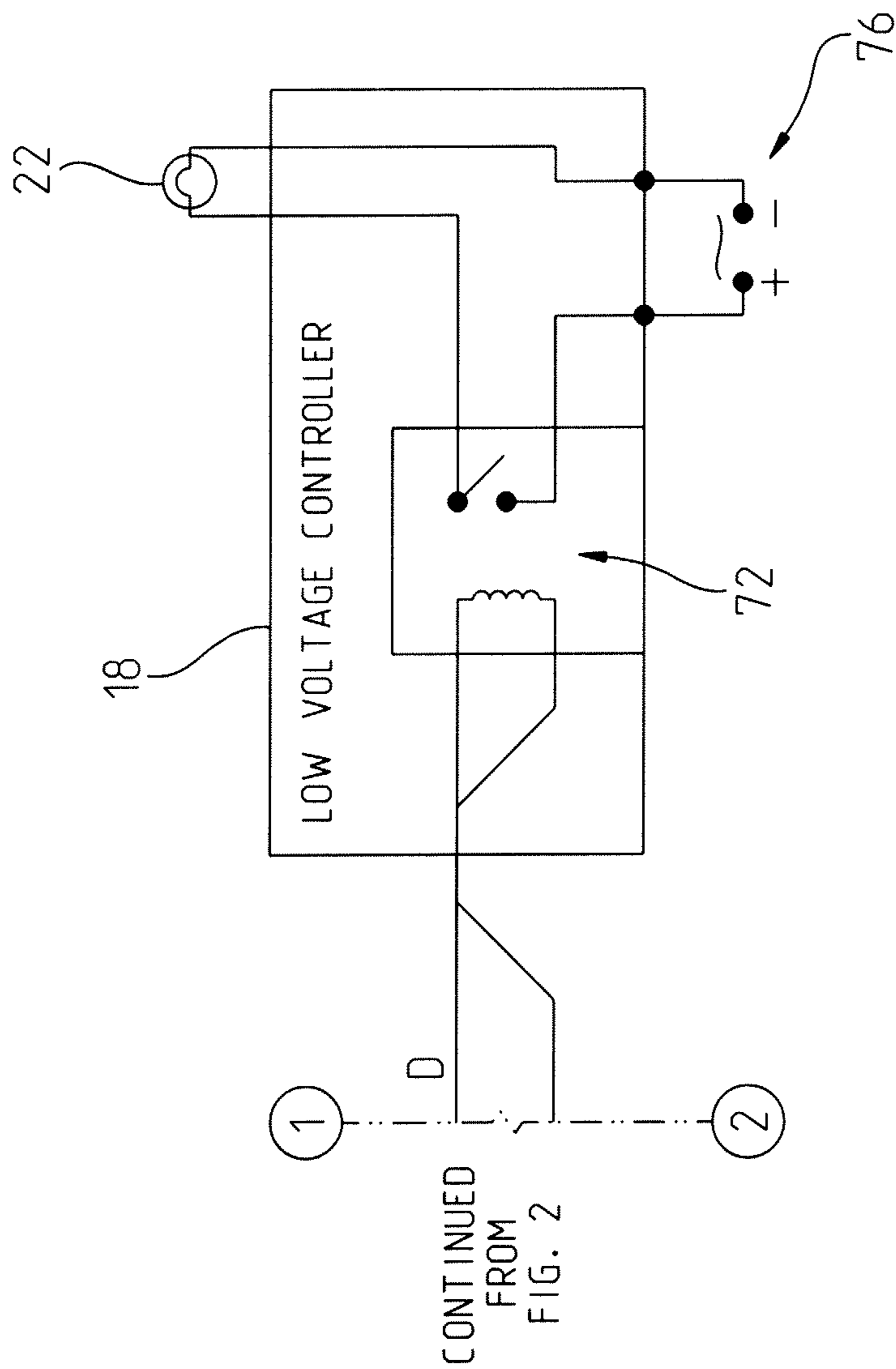


FIG. 3

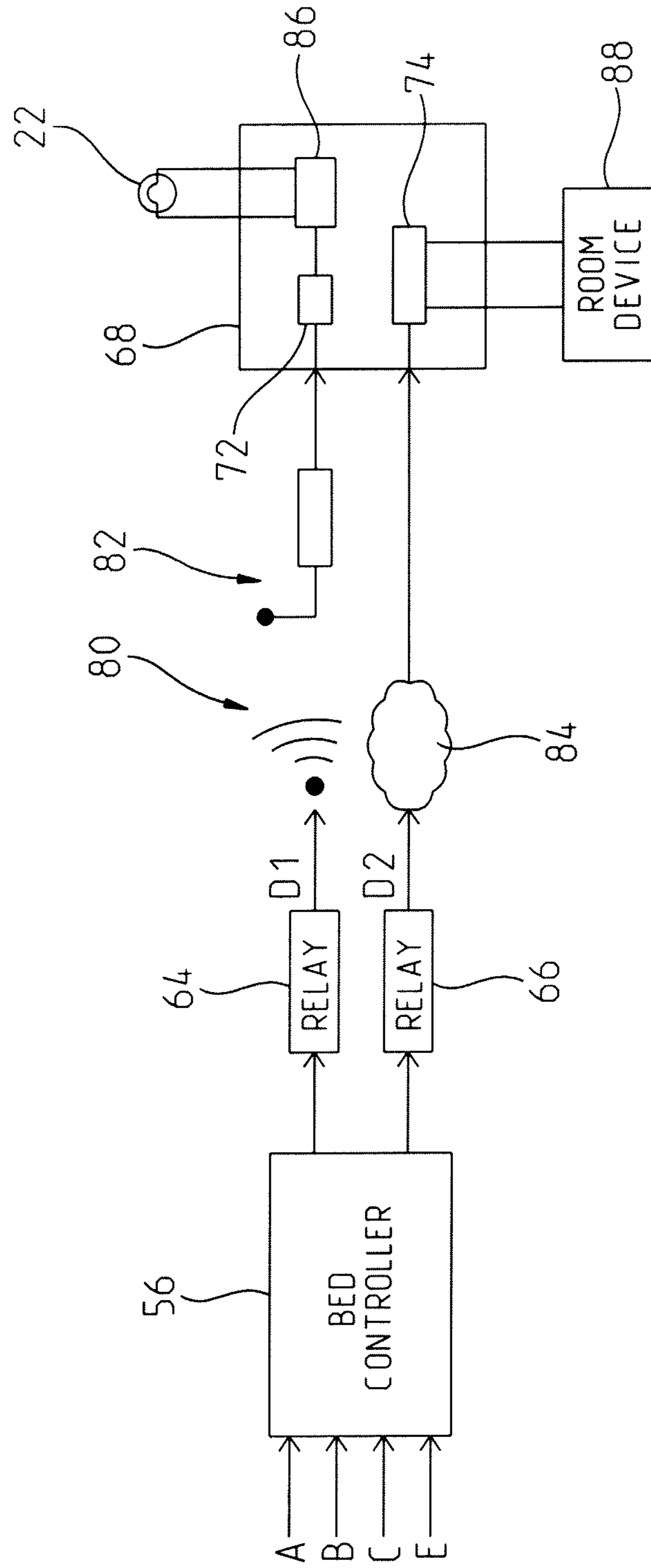


FIG. 4

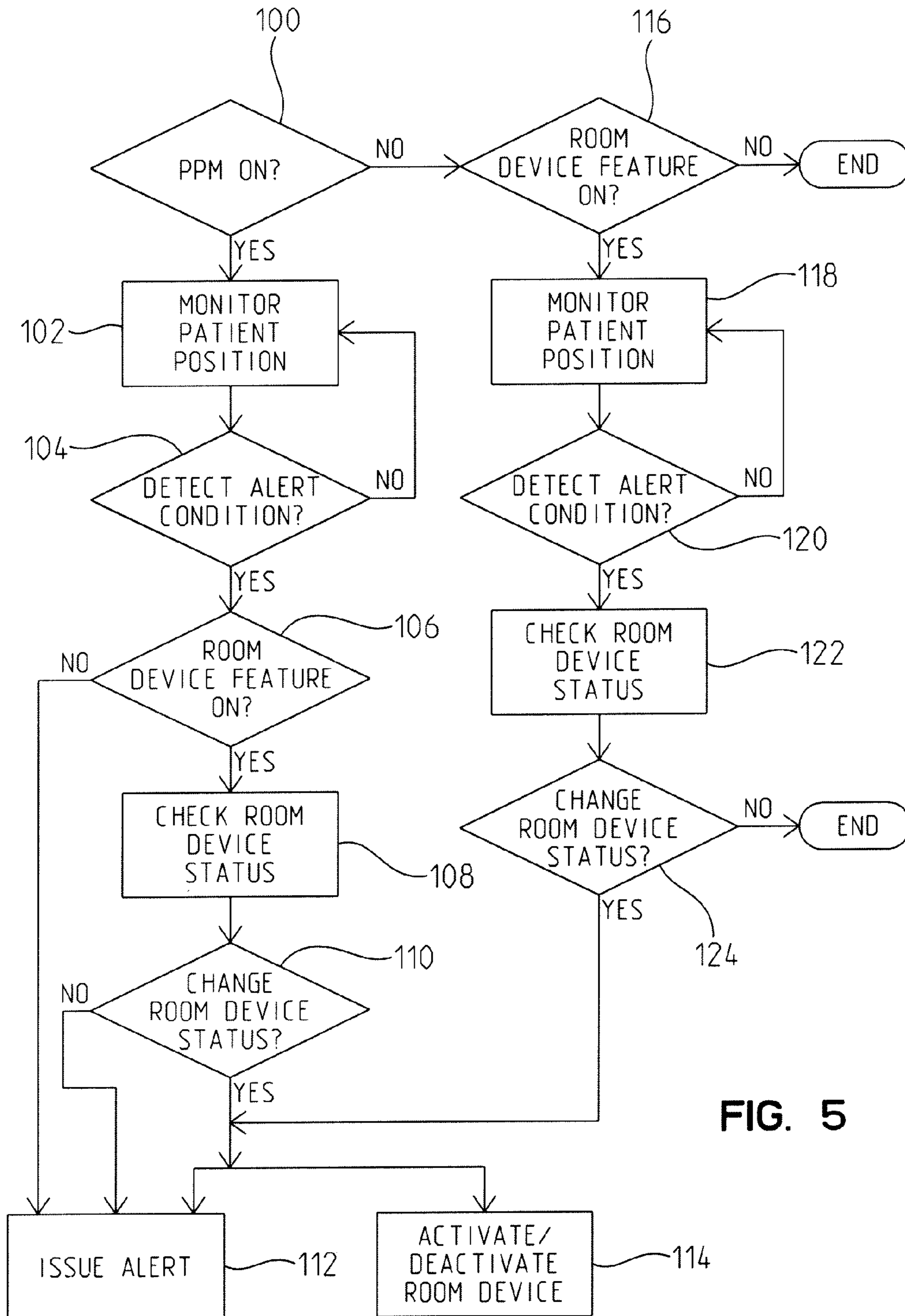


FIG. 5

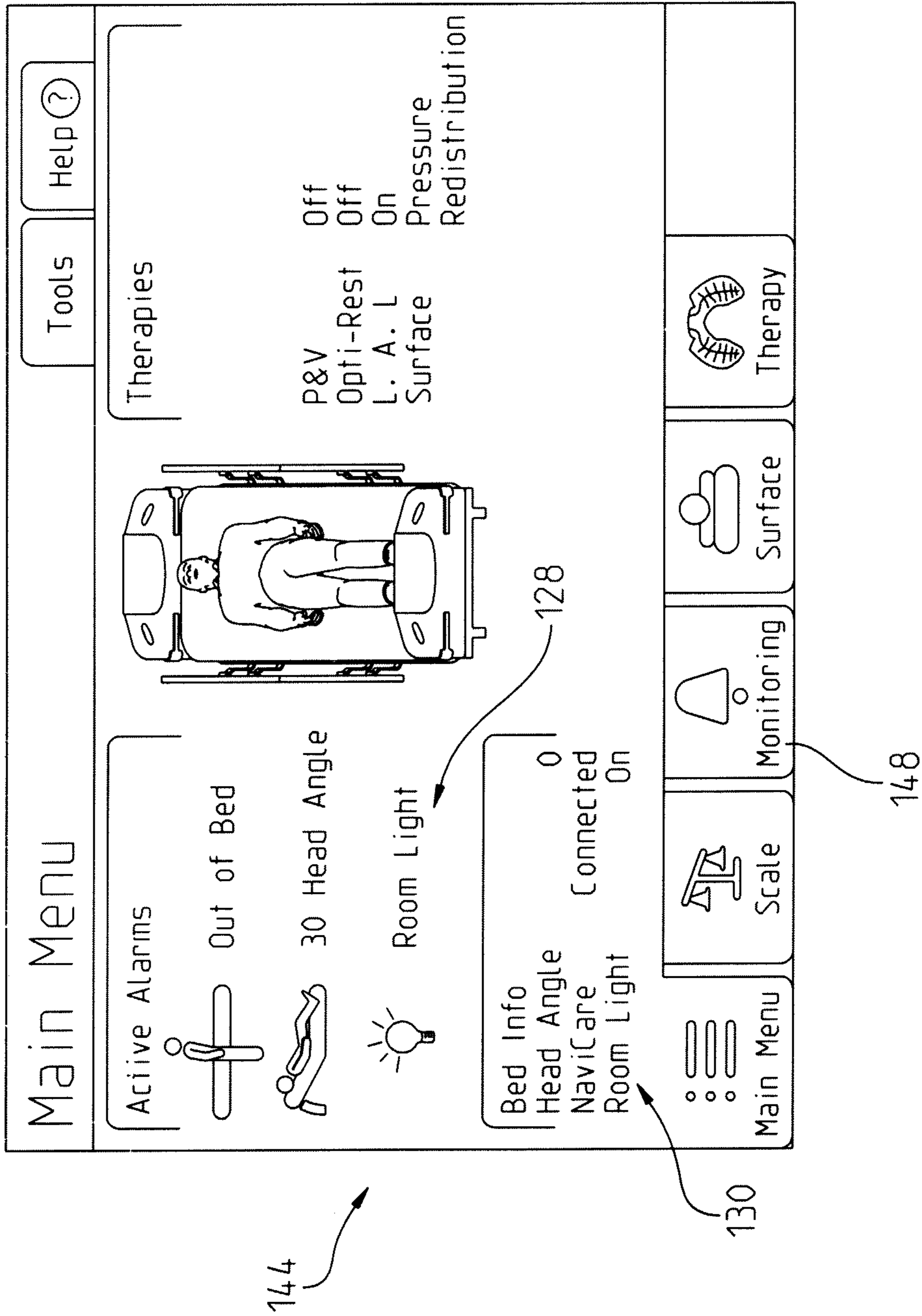


FIG. 6

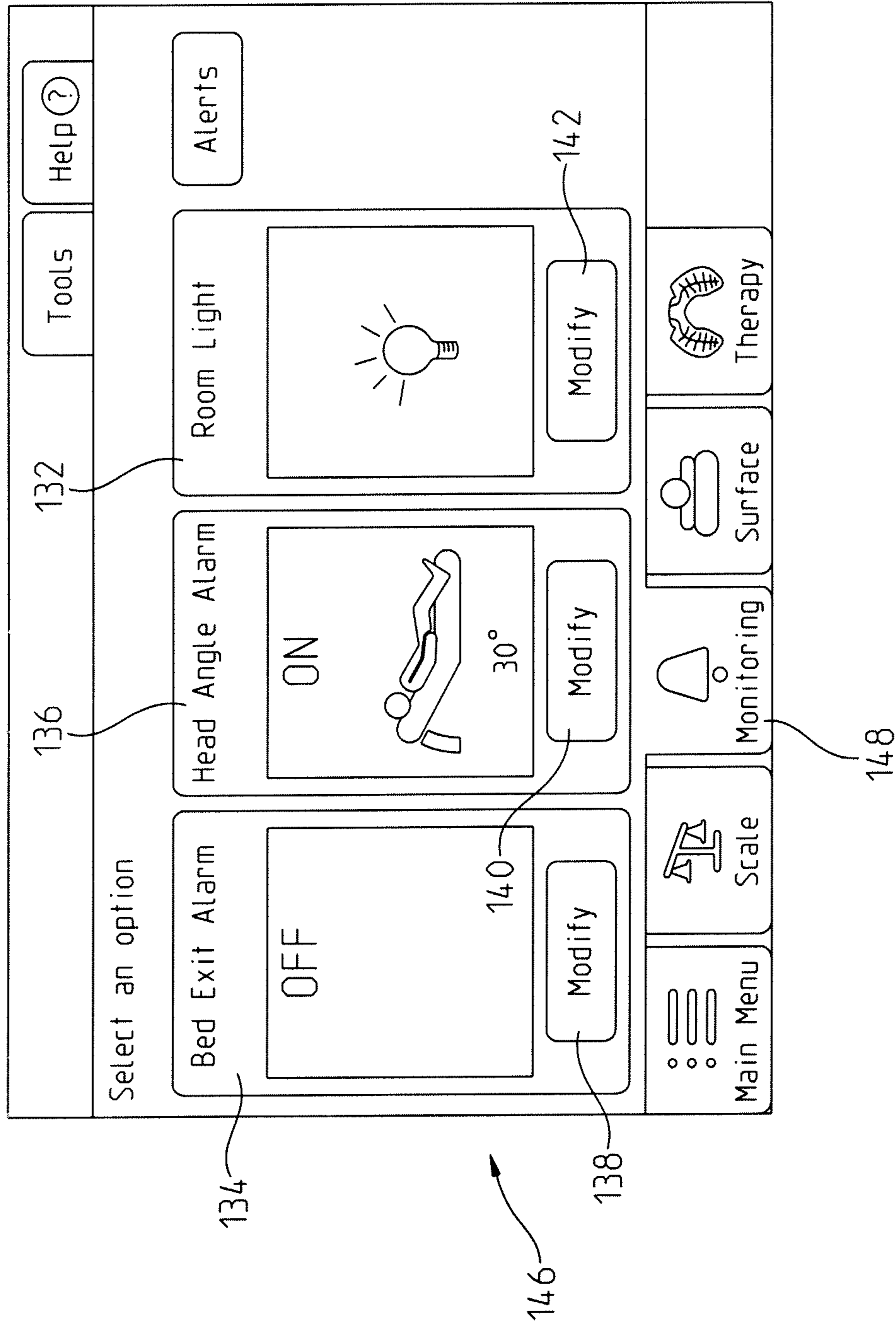


FIG. 7

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APPARATUS FOR CONTROLLING ROOM LIGHTING IN RESPONSE TO BED EXIT

BACKGROUND

This disclosure relates generally to patient beds and patient monitoring systems. More particularly, this disclosure relates to systems in which lighting in a patient's room is automatically controlled in response to a patient exiting the patient's bed.

Patient beds, such as those commonly found in healthcare facilities and other locations in which health care is provided, can have a number of features, including one or more features that are electronically controlled. Some examples of patient beds are the TotalCare® Bed System, the VersaCare® bed, the Advanta™ bed, and the Affinity® birthing bed, all of which are available from the Hill-Rom Company, Inc.

Bed exit systems, and other patient position monitoring systems, monitor a patient's position relative to a bed and issue alerts if the patient's position has changed or if the patient has moved to a position that may require the caregiver's attention. For example, if the patient has exited the bed, the patient position monitoring system may issue an audible or visual alarm. Some patient beds, such as the TotalCare® bed, the VersaCare® bed, and the Advanta™ bed, have a bed exit or patient position monitoring system incorporated therein. Some examples of patient beds that have a patient position monitoring feature are disclosed in U.S. Pat. Nos. 7,515,059; 7,538,659; 7,557,718; 7,568,246; 7,657,956 and 7,679,520. Other patient position monitoring systems may be sold as separate devices that can be used in connection with a bed.

Some patient beds can be connected to a healthcare facility's healthcare communication system (e.g., a nurse call system) to send data generated at the bed to the healthcare communication system. For example, if a patient has exited the bed, the bed may send a bed exit signal to the nurse call system, and the nurse call system may send a notification to an output device that is connected to the nurse call system (such as a dome light, a nurse's station, a speaker, or a caregiver's mobile communication device). Some examples of systems in which beds may communicate data to a nurse call system or hospital communication system are disclosed in U.S. Pat. Nos. 7,319,386; 6,362,725; and 5,699,038.

SUMMARY

The present invention comprises one or more of the features recited in the appended claims and/or the following features which, alone or in any combination, may comprise patentable subject matter.

According to one aspect of this disclosure, a bed system includes a bed, and a bed exit monitor coupled to the bed. The bed exit monitor detects a patient exiting the bed. The bed system also includes a controller that is coupled to the bed exit monitor and to lighting, which may be coupled to the bed or spaced from the bed. The lighting illuminates at least a portion of a room in response to being turned on. The lighting is configured to be turned on by a manually operated switch. The controller is configured to receive a first signal from the bed exit monitor and use the first signal to control the turning on of the lighting independently of the manually operated switch.

The bed system may include a detector coupled to the controller. The detector may be configured to determine whether the lighting has been turned on or off via the manually operated switch. The controller may be configured to

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receive a status signal from the detector, where the status signal indicates whether the lighting is turned on or off.

The controller may be configured to turn on the lighting if the first signal indicates that the patient has exited the bed and the status signal indicates that the lighting is turned off. The controller may be configured to enable the lighting to remain turned on if the first signal indicates that the patient has exited the bed and the status signal indicates that the lighting is turned on. The controller may be configured to receive a second signal from the bed exit monitor and use the second signal to control the turning off of the lighting independently of the manually operated switch.

The bed exit monitor may be configured to detect a patient having entered the bed. The second signal may indicate that the patient has entered the bed. The controller may be configured to enable the lighting to turn off if the second signal indicates that the patient has entered the bed and the status signal indicates that the lighting has been turned off via the manually operated switch. The controller may be configured to generate an alert signal indicating whether the lighting is turned on or turned off in response to signals from the bed exit monitor.

The bed system may include an output device configured to display an indication of whether the lighting is turned on or turned off. The bed system may include an input device coupled to the controller, where the input device is configured to receive an input signal, and the controller is configured to use the input signal to enable or disable the turning on and turning off of the lighting in response to signals from the bed exit monitor independently of the manually operated switch. The bed system may include a connector coupled to the controller, where the connector is configured to couple the controller to a healthcare communication system.

The controller may be configured to send an alert signal to the healthcare communication system if the lighting is turned on or off in response to signals from an ambient light detector. The healthcare communication system may be a nurse call system.

According to another aspect of this disclosure, a room lighting control apparatus for use in connection with a room in which a bed usable by a patient is located, includes a controller configured to receive a position signal corresponding to the patient's position relative to the bed, use the position signal to determine whether to turn on lighting in the patient's room, the lighting being configured to provide illumination in the patient's room, and send a lighting control signal to the room lighting to turn on the room light if the patient has exited the bed. The controller may be configured to determine, from the position signal, whether the patient has exited the bed. The controller may be configured to determine whether the room lighting is turned on.

The room lighting control apparatus may include a detector coupled to the controller, wherein the controller is configured to receive a status signal from the detector, the status signal indicating whether the room lighting is turned on. The lighting control signal may be configured to enable the room lighting to remain turned on if the status signal indicates that the room lighting is turned on. The controller may be configured to receive a second position signal and send a second room lighting control signal to the room lighting to turn off the room lighting if the second position signal indicates that the patient is positioned on the bed.

According to another aspect of this disclosure, a room device control apparatus for use in connection with a room comprising a bed usable by a patient, where the room device control apparatus includes a controller configured to receive a position signal corresponding to the patient's position rela-

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tive to the bed, use the position signal to determine whether to turn on a room device, the room device being configured to provide output in or adjacent to the patient's room, the room device being activatable by a manually operated switch, the controller being configured to send a room device control signal to the room device to turn the room device on or off in response to the patient changing position relative to the bed, independently of the manually operated switch, and a conduit coupling the controller to the room device. The conduit may include a wireless communication link.

BRIEF DESCRIPTION OF THE DRAWINGS

The detailed description particularly refers to the following figures, in which:

FIG. 1 is a perspective view of a patient's room, including a bed and a connection between the bed and room lighting;

FIG. 2 is a schematic diagram illustrating a portion of one embodiment of a room lighting control system connected to a bed;

FIG. 3 is a schematic diagram illustrating another portion of the system of FIG. 2;

FIG. 4 is a schematic diagram illustrating another embodiment of a room lighting control system connected to a bed;

FIG. 5 is a flow diagram illustrating a process for controlling room lighting; and

FIGS. 6-7 are sample screen displays for a bed system including a room lighting control feature.

The same reference numbers may be used to refer to like components in the several drawings.

DETAILED DESCRIPTION

While the concepts of the present disclosure are susceptible to various modifications and alternative forms, specific exemplary embodiments thereof have been shown by way of example in the drawings and will herein be described in detail. It should be understood, however, that there is no intent to limit the concepts of the present disclosure to the particular forms disclosed, but on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the invention as defined by the appended claims.

Referring to FIG. 1, a patient's room 8 includes a bed 10 and one or more room devices, such as lighting 22, which may be located in the room 8 or an adjacent room, such as a washroom. Other possible room devices include an overbed light or night/reading light 24 and a television or entertainment system 28. The lighting 22, 24 may be coupled to the bed (e.g. to a portion of the bed frame, or to the headboard, foot board, or one of the siderails). Alternatively, the lighting 22, 24 may be spaced from the bed (e.g. mounted to a wall, table or ceiling of the room 8). In either instance, the lighting 22, 24 is configured to illuminate at least a portion of the room or an adjacent room (such as a washroom). In other words, the lighting 22, 24 is a device that provides ambient light upon being activated.

Typically, the bed 10 includes a frame supported by wheels or casters, a mattress supported by the frame, a number of siderails, a headboard and a footboard, as shown; however, all of these elements are not required for the purposes of the present disclosure.

The bed 10 has a number of electronically controlled functions. A patient input-output device 52 receives and processes electrical input (e.g. voltage) from number of manually operable switches (such as membrane switches or the like) coupled to the patient input-output device 52, which enable a

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patient to activate and deactivate certain bed functions when the patient is positioned on the bed 10. For example, some beds permit the patient to raise and lower the bed or certain sections thereof, place a call to a hospital communication system, such as a nurse call system, or turn on an overhead light, by touching these switches. The patient input-output device 52 includes circuitry configured to convey voltage generated by the manually operable switches to a bed controller 56, described below. In the illustrated embodiment, a patient input-output device 52 is mounted to the inwardly facing side of at least one of the siderails 44, 46 of the bed 10 (i.e., facing toward the mattress).

A caregiver input-output device 50 receives and processes electrical input (e.g. voltage) from one or more input devices mounted thereto, which enable a caregiver to configure, activate and/or deactivate certain of the electronically controlled bed functions. For example, some beds permit the caregiver to raise and lower the bed or certain sections thereof, or activate and deactivate other features of the frame or the mattress, such as chair, CPR, Trend, and reverse Trend positions, pressure relief, turn assist, or pulmonary therapy features of the mattress (e.g. lateral rotation, percussion and/or vibration features), by physically contacting the caregiver input-output device 50.

Typically, the caregiver input-output device 50 includes manually operable switches, such as membrane switches. Some caregiver input-output devices have touchscreen displays, which may include a graphical user interface. For example, FIGS. 6-7 illustrate touchscreen user interfaces that may be incorporated into the caregiver input-output device 50 to, among other things, enable a caregiver to configure, activate and/or deactivate the room lighting control features described herein. The caregiver input-output device 52 includes circuitry configured to convey voltage generated by the switches, touch sensors, or other input devices mounted thereto to the bed controller 56, described below. In the illustrated embodiment, a caregiver input-output device 50 is mounted to the outwardly facing side of at least one of the siderails 44, 46 of the bed 10 (i.e., facing away from the mattress).

A patient position monitor is coupled to the bed 10. In the illustrated embodiment, the patient position monitor includes a bed exit monitor 54. The bed exit monitor 54 includes one or more force sensors, or a weigh scale (not shown), and a controller, such as a microcontroller or microprocessor. The sensor or scale generates an electrical output (e.g. voltage) in response to a change in the patient's weight or a change in the force applied to the bed. The controller receives and processes the electrical output generated by the sensor or scale to determine whether a bed exit has occurred. If a bed exit has occurred, the controller generates an electrical output (e.g. voltage). The sensor or scale may be coupled to the bed frame, or may be supported by a pad, mat, or bladder that lies on top of, within, or underneath the mattress, for example.

The illustrated bed 10 has a built-in patient weighing system, similar to that of beds that are currently commercially available, such as the TotalCare® bed. The patient weighing system includes a weigh scale (e.g. a number of load cells) coupled to the frame, and a controller configured to determine the weight of a patient positioned on the bed based on the output of the weigh scale. In the illustrated embodiment, the patient weighing system also functions as a bed exit monitor. If the weight of the patient, as detected by the bed's built-in weighing system, decreases to zero or nearly zero in a short period of time (with a delay to account for patient movement in the bed), the bed considers this to be an indication that the patient has exited the bed. However, as noted above, there are

many other forms of bed exit monitoring systems, including systems that do not involve the bed's weigh scale, systems that are incorporated into the mattress, and systems that are not attached to the frame or to the mattress, but rather are sold as separate devices that may be used in connection with the bed. The presently described room lighting control feature may be configured to receive and process bed exit signals from any bed exit monitoring device or system, whether or not the system is incorporated into the bed.

In some embodiments, the patient position monitor or bed exit monitor may be configured to detect other changes in the position of the patient relative to the bed, alternatively or in addition to bed exit. For example, some patient position monitors are capable of detecting when the patient is sitting up in bed, or sitting or laying on an edge of the bed. Other patient position monitors are capable of detecting the amount of movement, or lack thereof, of the patient over a period of time. Some beds that have a raisable head section have a monitor that is capable of monitoring the angle of the head section of the bed relative to the frame or relative to the horizontal (and thereby, the approximate angle of the patient's upper body). The presently described room lighting control feature may be configured to receive and process electrical output of a patient position monitor or bed monitor, whether the output relates to a bed exit or some other change in the position of the patient relative to the bed.

A conduit **12** conveys low voltage electronic communications generated by a patient position or bed monitor located at the bed **10** to one or more other devices that are spaced from the bed **10** (such as other devices that are in or adjacent to the room **8**). The conduit **12** is coupled to a connector **14**, which, as illustrated, is mounted to a wall of the room **8**. In general, all or portions of the conduit **12**, as well as other conduits mentioned in this disclosure (e.g. conduits **16**, **20**, **26**, **30**, **34**, **48**) may include direct connections or network connections facilitated using a suitable communications infrastructure and protocol (such as a Controller Area Network or Echelon network), and may include insulated wiring or cable, or may include a wireless transmitter that transmits the electrical signals wirelessly to a wireless transceiver using a suitable wireless communications protocol. The connector **14** may include a 37-D sub connector, a wireless transceiver, or an interface unit, such as an NIU (network interface unit), a BIU (bed interface unit), or other similar suitable electronic communications link.

A conduit **16**, illustratively located in or behind a wall of the room **8**, conveys the electronic communications from the connector **14** to a low voltage controller **18**. The low voltage controller **18** converts the signals to the appropriate voltage needed for the receiving device. In the case of the lighting **22**, the low voltage controller converts the low voltage received from the bed **10** to a high voltage (e.g. 120 VAC) suitable for illuminating the lighting **22**.

In the illustrated embodiment, the low voltage controller **18** is located in a headwall **62**; however, this need not be the case. The low voltage controller **18** may be mounted to, in, or behind a wall of the patient room **8**. In some embodiments, the low voltage controller **18** may be located nearer to the room device(s) **22**, **24**, **28** to which it conveys high voltage than appears from the illustration of FIG. **1**.

Electrical communications that originate at the bed **10** may also be communicated to a nurse call system or other health-care communication system. In the illustrated embodiment, a conduit **30**, illustratively located in or behind a wall of the room **8**, conveys electrical signals that originated at the bed **10** from the connector **14** to a user station **32** of a nurse call system. The signals may then be conveyed by the user station

32 to a master station **36** of the nurse call system via a conduit **34**, an input-output device **38** (e.g., a junction box or an input-output board), and a conduit **48**. In other embodiments, the user station **32** may be omitted and the signals conveyed directly from the connector **14** to the input-output device **38** or to the master station **36**. From the master station **36**, the signals may be communicated to other components of the nurse call system (such as an electronic status board or a caregiver's mobile communication device) via an input-output board and/or a network switch, such as a power over Ethernet ("PoE") switch, server computers, networking equipment, and other electronic communications components as may be required to convey the electrical signals to the appropriate device or devices of the nurse call system.

Referring to FIG. **2**, electronically-controlled bed functions of the bed **10** are managed by the bed controller **56**. The bed controller **56** includes one or more microprocessors or microcontrollers and electrical circuitry located in a housing that is mountable to a fixed location on the bed **10**. In the illustrated embodiment, a bed controller **56** is located between the inwardly facing and outwardly facing sides of each of the siderails **44**, **46**, so that the patient input-output device **52** and the caregiver input-output device **50** are connected to opposite sides of the bed controller **56**. However, the location of the bed controller **56** on the bed **10** is not important for the purposes of the present disclosure.

The bed controller **56** receives electrical input from other bed modules or devices via a bed network **58**. The bed network **58** is an electronic network configured according to a CAN or Echelon protocol, or other suitable network communications protocol.

The designation "E" represents the occurrence of an event at the caregiver input-output device **50** in which a caregiver has turned on the room lighting control feature (e.g. by pressing a switch or activating a touchscreen control). If the event "E" occurs at the caregiver input-output device **50**, a voltage output is transmitted to the bed controller **56** via the bed network **58**. The bed controller **56** may store an indication that the event "E" has occurred in memory, which may be updated if the bed controller **56** receives an indication from the caregiver input-output device **50** that the room lighting control feature is turned off.

The lighting **22** or other room device (e.g. **24**, **28**) may be turned on by a manually operated switch **40**. The designation "A" represents the occurrence of an event in which a person has contacted the manually operated switch **40** to turn on the lighting **22** or other room device. If the event "A" occurs, a voltage output is transmitted to the bed controller **56** via the bed network **58**. In the illustrated embodiment, the manually operated switch **40** is located on the patient input-output device **52**, which is mounted to a siderail **44**, **46** of the bed **10**. In other embodiments, the manually operated switch **40** may be a wall- or device-mounted switch for an overhead light located in the patient's room or an adjacent washroom, in which case, the switch **40** may be connected by suitable wiring to the bed controller **56** via the connector **14** and the conduit **12**. If the switch **40** is a wall- or device-mounted switch, then, of course, the event "A" occurs at the switch **40** and not at the patient input-output device **52**. The bed controller **56** may store an indication that the event "A" has occurred in memory, which may be updated if the bed controller **56** receives an indication from the patient input-output device **52** that the lighting **22** has been turned off.

The designation "B" represents the occurrence of an event at the bed exit monitor **54** in which a bed exit has been detected. If the event "B" occurs at the bed exit monitor **54**, a voltage output is transmitted to the bed controller **56** via the

bed network **58**. The bed controller **56** may store an indication that the event “B” has occurred in memory, which may be updated if the bed controller **56** receives an indication from the bed exit monitor **54** that the patient has returned to the bed (e.g. by detecting at the bed exit monitor that a force has been applied to the bed).

The designation “C” represents the occurrence of an event in which ambient light is detected by an ambient light sensor or detector **60**. The ambient light sensor **60** is located in an area that is illuminated when the lighting **22** is turned on. For example, if the lighting **22** is located in the patient’s room, the ambient light sensor **60** is located in the patient’s room. If the lighting **22** is located in an adjacent room (such as a wash-room), then the ambient light sensor is located in the adjacent room. The ambient light sensor **60** may include a photodiode, phototransistor, or other suitable device for detecting ambient light. If the event “C” occurs at the ambient light sensor **60**, a voltage output is transmitted to the bed controller **56**.

The bed controller **56** includes circuitry configured to implement the logic: IF A OR [E AND (B AND NOT C)] THEN D. The designation “D” represents the occurrence of an event in which the result of executing this logic is “true.” In other words, if the switch **40** has been touched, or the room lighting control feature is turned on and a bed exit has occurred and the lighting **22** is not on, then the event “D” has occurred. If the event “D” has occurred, then the bed controller **56** sends an electrical output in the form of a pulse to the connector **14** via a momentary relay **64**.

Referring to FIG. **3**, the electrical output resulting from the occurrence of the event “D” is transmitted from the connector **14** to the low-voltage side of the low voltage controller **18** via the conduit **16**. The low voltage controller **18** converts the low voltage to a high voltage via a high-voltage latching relay **72** coupled to a 120 VAC **76**. The higher voltage then illuminates the lighting **22**.

FIG. **4** illustrates another embodiment in which two room devices, the lighting **22** and another room device **88**, are controlled by the room lighting control feature. The room device **88** may be the overbed light **24**, the television or entertainment system **28**, a room light or washroom light, or another device that is typically activated by a manually operated switch and is spaced from the bed **10**.

In the embodiment of FIG. **4**, the bed controller **56** receives electrical inputs in response to the occurrence of the events A, B, C, E, and executes the logic described above to determine whether the event “D” has occurred. If the event “D” has occurred, then the bed controller **56** transmits an electrical output (e.g. voltage) D1 to the lighting **22** and transmits an electrical output D2 (e.g. voltage) to the room device **88**. The relay **66** is a momentary relay similar to the relay **64**.

FIG. **4** additionally illustrates additional or alternative methods of communicating electrical output from the bed controller **56** to a low voltage controller **68**. The low voltage controller **68** is similar to the low voltage controller **18** in many respects, however it contains additional components. The electrical output D1 is transmitted to the low voltage controller **68** via a wireless communication link including a wireless transmitter **80** and a wireless transceiver **82**. The electrical output D2 is transmitted to the low voltage controller **68** via a communications network **84**, which may be a CAN, Echelon, or other suitable network. In either case, the low voltage controller **68** may be modified to include additional circuitry to convert the received transmissions into a form that is usable by the circuitry of the low voltage controller **68**.

Inside the alternate version of the low voltage controller **68** shown in FIG. **4**, an additional high voltage latching relay **74**

is used to convert the electrical transmission D2 to a higher voltage suitable for energizing the room device **88**.

Also, the low voltage controller **68** includes a dimmer circuit **86**, which is used to vary the intensity of the illumination when the lighting **22** is turned on. In this case, the low voltage controller **68** includes circuitry to implement the logic: IF A THEN FULL ON. In other words, if the event “A” occurs, then the lighting **22** is turned on at 100% intensity. The low voltage controller **68** also includes circuitry to implement the logic: IF [E AND (B AND NOT C)] THEN DIM. In other words, if the event “D” occurs, then the lighting is turned on at less than 100% intensity (e.g. at 50% of full intensity). The dimmer logic may be implemented using a microcontroller or with relays. If a microcontroller is used, then the dimmer circuit **86** may include a ramping feature whereby the intensity of the ambient light output by the lighting **22** is increased over a period of time in response to the occurrence of the event “D.”

FIG. **5** illustrates a process that may be executed by the bed controller **56** to integrate the features of a room device control system (such as the room lighting control system described above) with a bed exit alarm system, and connect the room device control system to a nurse call system or other health-care communication system. At step **100**, the bed controller **56** determines whether a patient position monitor (e.g. the bed exit monitor **54**) is turned on. If the patient position monitor has been turned on, then at step **102** the patient’s position relative to the bed is monitored by the patient position monitor, for the occurrence of an alert condition, such as a patient exiting the bed, a patient entering the bed, or another change in position of the patient relative to the bed that may require a caregiver’s attention.

At step **104**, the bed controller **56** determines whether an alert condition has occurred (e.g., event “B”). If an alert condition has occurred, then at step **106**, the bed controller **56** determines whether the room device control feature has been turned on (e.g., event “E”). If only the bed exit alarm is turned on, then the bed controller **56** issues a bed exit alert at step **112**. The bed exit alert may include activating a visual indicator, such as a dome light, activating an audible alarm, and/or sending an electronic communication to an output device, such as a user station, master station, electronic status board, or mobile communication device connected to a nurse call system.

If the room device control feature is turned on, then at step **108** the bed controller **56** checks the status of the room device or devices that are connected to the room device control feature. For instance, in the case of the lighting **22**, the bed controller **56** checks for the occurrence of the event “C.” At step **110**, the bed controller **56** determines whether the status of the room device needs to change. For instance, in the case of the lighting **22**, if the event “C” has occurred, then the bed controller **56** proceeds to turn on the lighting **22** at step **114**. However, if the lighting **22** is already turned on, then the status of the lighting **22** is not changed.

At step **112**, the bed controller may send an alert indicating that the room device has been turned on, if the room device control feature of a particular installation has been configured to do so. Some versions of the room device control feature may not send any alerts, in which case the process may proceed directly to step **114**. The bed exit alert may include activating a visual indicator, such as a dome light, activating an audible alarm, and/or sending an electronic communication to an output device, such as a user station, master station, electronic status board, or mobile communication device connected to a nurse call system.

At step **114**, the bed controller **56** activates or deactivates the room device as needed according to the inputs and executed logic. For instance, if the room device control feature is configured to turn on a light in response to a patient exit, then the light is turned on at step **114**. If the room device control feature is configured to turn off a light in response to a patient returning to his or her bed, then the light is turned off at step **114**. There are many possible combinations of logic for turning a room device on or off in response to the detection of an alert condition relating to a patient's position relative to a bed, and any system that causes a room device to be activated or deactivated in response to the occurrence of such an alert condition falls within the scope of this disclosure.

The room device control feature may be used even if the patient position monitoring alarm (e.g. bed exit alarm) feature is not turned on. If the patient position monitor is not turned on, then at step **116** the bed controller **56** determines whether the room device control feature is turned on. If the room device control feature is turned on, then the bed controller **56** monitors the electrical output of the patient position monitor to determine at step **118**. If the bed controller detects an alert condition at step **120**, then at step **122** the bed controller **56** determines the status of the room device in a similar fashion as described above with reference to step **108**. At step **124**, the bed controller **56** determines whether the status of the room device needs to change in a similar fashion as described above with reference to step **110**. If the status of the room device needs to change in response to the occurrence of the alert condition, then the process proceeds to step **112** (optional) and step **114**, as described above.

The illustrated bed **10** includes a caregiver input output device **50** that may be configured to display a "main menu" user interface such as the user interface **144** shown in FIG. **6**. The user interface **144** enables a caregiver to view the status of various bed features, including a room lighting control feature. The user interface **144** displays an indication **128** if the room lighting control feature is turned on. The user interface **144** also displays an indication **130** of the status of the room light. In the illustrated example, the user interface **144** indicates that the room lighting control feature is turned on and that the room light controlled by the room lighting control feature is turned on.

A user interface such as the user interface **146** shown in FIG. **7** is displayed if a caregiver contacts the monitoring button **148**. The user interface **146** enables the caregiver to configure the bed exit alarm, head angle alarm, and/or room lighting control feature. If the bed exit alarm **134** is turned on (e.g. by a caregiver pressing the "modify" button **138**, the bed **10** will send an alarm signal to the nurse call system if it detects the patient exiting the bed. Similarly, if the head angle alarm **136** is turned on (e.g. by a caregiver pressing the "modify" button **140**), the bed **10** will send an alarm signal to the nurse call system if it detects the angle of the head section of the bed being lower than 30 degrees from horizontal.

As mentioned above, the room lighting control feature **132** can be turned on (e.g. by a caregiver pressing the "modify" button **142**) independently of the bed exit alarm **134** and the head angle alarm **136**. For example, if the bed exit alarm **134** is set, and the room lighting control feature **132** is turned on, and a bed exit is detected, the bed **10** will send a bed exit alarm signal to the nurse call system and turn on the room lighting (e.g. one or more of the room devices **22**, **24**, **28**, as may be configured for a particular installation).

If the bed exit alarm **134** is not set, and the room lighting control feature **132** is turned on, and a bed exit is detected, the bed **10** will turn on the room lighting but will not send a bed exit alarm signal to the nurse call system. However, as

described above, the bed **10** may send a room lighting signal to the nurse call system to indicate to the nurse call system that the room lighting has been turned on. If the room lighting control feature **132** is turned off, then the room lighting will not be controlled by the bed, but will instead be controlled by the manually operated switch **40**.

There are many advantages of the present disclosure arising from the various features described herein. It will be noted that alternative embodiments of the present disclosure may not include all of the features described yet still benefit from at least some of the advantages of such features. Those of ordinary skill in the art may readily devise their own implementations of the method, apparatus, and system that incorporate one or more of the features of the present invention and fall within the spirit and scope of the present disclosure as defined by the appended claims.

The invention claimed is:

1. A bed system, comprising a bed,

a bed exit monitor coupled to the bed, the bed exit monitor being operable to detect a patient exiting the bed, and a controller coupled to the bed exit monitor and to lighting configured to illuminate at least a portion of a room in response to being turned on, the lighting configured to be turned on by a manually operated switch, the controller being configured to receive a first signal from the bed exit monitor and use the first signal to control the turning on or off of the lighting independently of the manually operated switch, and to send an alert signal to a health-care communication system if the lighting is turned on or off in response to signals from an ambient light detector.

2. The bed system of claim **1**, comprising a detector coupled to the controller, the detector being configured to determine whether the lighting has been turned on or off via the manually operated switch, the controller being configured to receive a status signal from the detector, the status signal indicating whether the lighting is turned on or off.

3. The bed system of claim **2**, wherein the controller is configured to turn on the lighting if the first signal indicates that the patient has exited the bed and the status signal indicates that the lighting is turned off.

4. The bed system of claim **3**, wherein the controller is configured to enable the lighting to remain turned on if the first signal indicates that the patient has exited the bed and the status signal indicates that the lighting is turned on.

5. The bed system of claim **1**, wherein the controller is configured to receive a second signal from the bed exit monitor and use the second signal to control the turning off of the lighting independently of the manually operated switch.

6. The bed system of claim **5**, wherein the bed exit monitor is configured to detect a patient having entered the bed and the second signal indicates that the patient has entered the bed.

7. The bed system of claim **1**, wherein the controller is configured to generate an alert signal indicating whether the lighting is turned on or turned off in response to signals from the bed exit monitor.

8. The bed system of claim **1**, comprising an output device configured to display an indication of whether the lighting is turned on or turned off.

9. The bed system of claim **1**, comprising an input device coupled to the controller, wherein the input device is configured to receive an input signal, and the controller is configured to use the input signal to enable or disable the turning on and turning off of the lighting in response to signals from the bed exit monitor independently of the manually operated switch.

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10. The bed system of claim 1, comprising a connector coupled to the controller, wherein the connector is configured to couple the controller to a healthcare communication system.

11. The bed system of claim 10, wherein the controller is configured to send an alert signal to the healthcare communication system if the lighting is turned on or off in response to signals from an ambient light detector.

12. The bed system of claim 11, wherein the healthcare communication system is a nurse call system.

13. The bed system of claim 1, wherein the lighting is spaced from the bed.

14. The bed system of claim 1, wherein the lighting is coupled to the bed.

15. A bed system, comprising:

a bed,

a bed exit monitor coupled to the bed, the bed exit monitor being operable to detect a patient entering or exiting the bed,

an ambient light detector, and

a controller coupled to the bed exit monitor and to lighting configured to illuminate at least a portion of a room in response to being turned on and to be turned on by a manually operated switch, the controller being configured to:

receive a first signal from the bed exit monitor,

use the first signal to control the turning on or off of the lighting independently of the manually operated switch,

receive a second signal from the bed exit monitor, the second signal indicating whether the patient has entered the bed, and

use the second signal to control the turning off of the lighting independently of the manually operated switch,

receive a status signal from an ambient light detector, the status signal indicating whether the lighting is turned on or off, and

enable the lighting to turn off if the second signal indicates that the patient has entered the bed and the status signal indicates that the lighting has been turned off via the manually operated switch.

16. A room lighting control apparatus for use in connection with a room in which a bed usable by a patient is located, the room lighting control apparatus comprising:

a controller configured to receive a position signal corresponding to the patient's position relative to the bed, use the position signal to determine whether to turn on lighting in the patient's room, the lighting being configured to provide illumination in the patient's room, send a lighting control signal to the room lighting to turn on the room light if the patient has exited the bed, and send an

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alert signal to a healthcare communication system if the lighting is turned on or off in response to signals from an ambient light detector.

17. The room lighting control apparatus of claim 16, wherein the controller is configured to determine, from the position signal, whether the patient has exited the bed.

18. The room lighting control apparatus of claim 16, wherein the controller is configured to determine whether the room lighting is turned on.

19. The room lighting control apparatus of claim 18, comprising a detector coupled to the controller, wherein the controller is configured to receive a status signal from the detector, the status signal indicating whether the room lighting is turned on.

20. The room lighting control apparatus of claim 19, wherein the lighting control signal is configured to enable the room lighting to remain turned on if the status signal indicates that the room lighting is turned on.

21. The room lighting control apparatus of claim 16, wherein the controller is configured to receive a second position signal and send a second room lighting control signal to the room lighting to turn off the room lighting if the second position signal indicates that the patient is positioned on the bed.

22. A room device control apparatus for use in connection with a room comprising a bed usable by a patient, a first room device, and a second room device, the room device control apparatus comprising:

a controller configured to receive a position signal corresponding to the patient's position relative to the bed, use the position signal to determine whether to turn on at least one of the first room device and the second room device, the first and second room devices being configured to provide output in or adjacent to the patient's room, the first and second room devices each being activatable by a manually operated switch, the controller being configured to send a room device control signal to at least one of the first room device and the second room device to turn the at least one of the first room device and the second room device on or off in response to the patient changing position relative to the bed, independently of the manually operated switch, and send an alert signal to a healthcare communication system if the lighting is turned on or off in response to signals from an ambient light detector, and

a conduit coupling the controller to the first and second room devices.

23. The room device control apparatus of claim 22, wherein the conduit includes a wireless communication link.

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